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## Description

This invention relates to a toothbrush and more particularly to a toothbrush having its bristles so arranged that it may be effective for removal of plaque from teeth by manual brushing.

There are a number of known toothbrush constructions, however, none appears to exhibit a tuft arrangement which performs several tooth and gumline cleaning functions regardless of the style or technique employed for brushing. While a number of toothbrush manufacturers set out specific brushing techniques on their brush containers, if a purchaser does not pay attention to them, or forgets them, then less than optimum teeth cleaning results.

CH-A-324623 discloses a toothbrush having bristles arranged in rows transverse to the head the bristles in one row all being inclined at the same angle to one side, the bristles in adjacent rows being inclined by the same angle to the opposite side.

US-A-3722020 provides a single tuft at the free head end, then a transverse row of three perpendicular tufts then two tufts inclined outwardly to opposite sides, then three perpendicular tufts, then two tufts inclined outwardly to opposite sides, this pattern repeating until the rear of the head is reached where there is a further single tuft.

It is an object of the present invention to provide a toothbrush which can effectively remove plaque from teeth and which is not sensitive to the brushing technique employed.

According to the present invention, there is provided a toothbrush head having a handle attached thereto, the head having a longitudinal axis and terminating in a free end remote from the handle, the head having a surface from which tufts of bristles extend generally upwardly, characterised in that the tufts being arranged in three groups in the form of rows which are transverse to the longitudinal axis; each row being longitudinally spaced apart along the head from the next adjacent row the tufts of each row of the first group being shorter in height than those in the other rows; the tufts in each row of the second group being so arranged that the endmost tufts each tilt laterally outwards towards respective sides of the head, and the remaining tufts of each row of each second group extend substantially perpendicularly to the head flat surface; some of the first and second groups alternating along the longitudinal axis of the head; the third group of tufts being located nearest to the head free end and including at least two tufts each tilting laterally outwards towards respective sides of the head.

Each tuft of the third group of tufts preferably tilts laterally outwards at an angle of about 30

degrees from the vertical. A row of said second group of tufts is preferably nearer to the handle than any other row of any group. Each of the endmost tufts of the second group of tufts preferably tilts laterally at about 12 degrees to the vertical.

In one form of the invention each row of said first group of tufts may comprise a plurality of laterally spaced tufts which together substantially span the width of the head, the said first group of tufts being laterally spaced from each other. Each tuft in said first group may be round or may be rectangular.

When a tuft is rectangular the shorter dimension of each rectangular tuft is preferably transverse to said longitudinal axis.

The said two tufts of said third row preferably also tilt forwardly, away from said handle. The said third group of tufts may include a third tuft located between said two tufts, said third tuft extending substantially from said head surface. All of the tufts in said third row preferably lie in a plane substantially orthogonal to said longitudinal axis.

Bristles of the individual tufts (each tuft comprising a distinct packet of bristles) are anchored into two types of cavities. Round cavities are preferably generously spaced so as to allow independent and uninhibited movement of each tuft of bristles. Polygonal (typically quadrangular) cavities are preferably closely spaced transversely so as to create continuous linear rows of bristle tips. These polygonal cavities may have rounded or angular corners. Densely spaced tufts typical of prior constructions, tend to move tangentially and thus push each other along as they sweep across tooth surfaces. Generously spaced tufts in accordance with the invention move erratically as they negotiate the often irregular contours of tooth crevices.

Preferably, each of a first group of tufts is anchored into generally round cavities and includes a centre or middle tuft and a pair of laterally outermost tufts, each of which are substantially perpendicular to the surface of the brush head. This group defines interproximal bristles which reach into crevices between teeth. The tufts of this group allow for individual bristle fibres to penetrate tight interproximal spaces and create fans of bristle tips as they are wiped across tooth surfaces. The term "generally round" includes circular in shape and nearly circular, such as elliptical.

Preferably, each of a second group of tufts is anchored into polygonal cavities, preferably quadrangular, and most preferably rectangular. There are preferably six or seven tufts, although five or eight tufts can also be used. Each tuft of the second group preferably extends substantially perpendicularly to the surface of the brush head.

Preferably, each of a third group of tufts is anchored into generally round cavities and this group includes approximately fourteen tufts positioned along the peramiter of the brush head. Approximately six outermost tufts on each side of the centre line of the head preferably tilt laterally outwards towards the nearest side of the brush head. Two forwardmost tufts (towards the free end of the head) may tilt laterally, towards their respective side of the brush head, and may also tilt forwards. These forwardmost tufts which may tilt forwards and laterally may also be considered as a fourth group or as a subgroup of the third group. The perimeter tufts of this group are preferably angled outwards from the centre line of the brush head so that they project into the gingival marginal area at the base of the crowns of the teeth. This action occurs as downward force is applied to the brush head and is not dependent upon a non-perpendicular orientation of the brush head relative to the tooth surfaces. These perimeter tufts of bristles are preferably angled so that they are unable to support one another structurally as downward and horizontal force is applied by the user.

Conventional, perpendicularly oriented bristle tufts tend to act as a series of columns and thus support suspended bristles as they pass over embrasures. This minimised overall compression strength afforded by this angles configuration allows individual tufts of bristles to penetrate embrasures, sub-gingival and interproximal spaces without being inhibited from doing so by surrounding bristle tufts.

Angled tufts move in the direction of their angle. As downward and horizontal force is applied to the brush head, tufts of bristle skid across tooth surfaces generally in the direction dictated by the angle of the tuft hole in which the bristles are anchored to the brush head rather than simply curling back in the opposite direction in which they are pushed. The preferred construction of this invention is to integrate multi-directional motion of bristles during unidirectional actuation of the brush.

When forced into the direction of their angle, bristles will spring out of crevasses as stresses are exceeded to contain them in place. This dynamic action will tend to fling plaque out of interproximal spaces. Conventional devices tend to pack plaque into spaces as the bristle tufts sweep over embrasures.

The weak flexure strength of generously spaced individual bristle tufts allows for the reduction of bristle height without causing the sensation of increased bristle stiffness. Conventional brushes trimmed to a shorter height are perceptibly stiffer and tend to cause trauma to the mucosa. Minimised bristle height allows for greater clearance (and thus enhance reach to the rear molars) between

the buccal surfaces of the teeth and the mucosal lining.

Angled tufts of bristle will assume varying heights as they are deformed, yet will be uniform in height when not in use. Angled bristles will project above the tips of straight bristles as the former are forced into a perpendicular orientation during use. This effect, caused by the greater length of the hypotenuse of a triangle, allows for the angled tufts to reach deeply into the interproximal and gingival marginal areas as perpendicular orientation is assumed.

Generally round tufts of bristles are preferably trimmed to a taller height than polygonal tufts. This configuration allows for the round tufts of bristles to penetrate interproximal spaces before tooth surfaces contact the bristle tips of polygonal tufts.

Compact linear rows of shorter polygonal tufts uniformly sweep plaque off tooth surfaces without inhibiting adjacent round tufts of bristles from penetrating embrasures.

The invention may be carried into practice in various ways and some embodiments will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a partial perspective view of a toothbrush formed in accordance with a first embodiment of this invention;

Figure 2 is a partial perspective view of a toothbrush formed in accordance with a second embodiment of this invention;

Figures 3 to 6 are plan views of the toothbrush of Figure 1 and illustrate, with respective Figures 3a to 6a, the function of the several groups of tufts and their contact with the teeth and gums; denoted as G;

Figure 7 is a plan view of a modified version of the toothbrush of Figure 2; and

Figure 8 is a plan view of a modification of the toothbrush of Figure 7.

Figure 1 shows a toothbrush 10 which includes a head 12 having a flat upper surface 14 and a longitudinal axis 16. The head is, typically, integrally joined to a handle 20, with head longitudinal axis 16 not necessarily coincident (as shown) with the longitudinal axis of handle 20, only a portion of the latter being shown. The handle construction forms no part of the invention. Both head 12 and handle 20 may be formed of suitable plastics material such as any of those commonly used.

Any of a first group of polygonal tufts is denoted as 24, with a single wide tuft 25 defining each group, each single wide tuft 25 having its longitudinal axis oriented transversely to the axis 16. It will be noted that the bristles in the tufts 25 are shorter than those of the bristles in the other groups. All of the groups 24 are parallel to each other and are orthogonal to the axis 16. The tufts

25 are termed bristle bars or bristle bars of tufts.

A second group of generally round tufts is denoted as 26, each group 26 also being oriented transversely to the axis 16. The two endmost tufts 30 of each row 26 are inclined or tilt laterally (sideways) towards the nearest respective side of the head 12, orthogonally to the axis 16, by about 12 degrees with respect to the vertical. The remaining three spaced apart tufts 32 in each group 26, termed interproximal bristles, are substantially perpendicular to the surface 14, i.e., vertical. Each tuft 30 is laterally spaced from its next adjacent tuft 32. The tufts 30 and 32 are preferably of the same diameter. The bristles in the tufts 30 are termed gumline bristles. Each group 26 thus contains both interproximal and gumline bristles. The groups of round tufts are preferably in rows transverse to the longitudinal axis 16 of head 12.

A third group 34 at the free end of the head 12 is defined by two laterally spaced generally round tufts 36. Each tuft 36 is inclined laterally towards its respective side of the brush head by about 30 degrees relative to the axis 16. Each tuft 36 also tilts with respect to a plane which contains it, by about 14 degrees to the vertical. Thus each tuft 36 tilts both laterally and forwards towards the free end of the head. The tufts 36 are termed leading tip bristles. This group 34 is preferably comprised of two or more tufts.

Referring now to Figure 2, the construction is the same as that shown in Figure 1, except that the wide bristle bar tufts 25, each of which defines a row 24, are each replaced by a row 240 defined by individual round tufts 242. The rows 240 of tufts 242, are aligned transversely to axis 16 as are the tufts in the other rows 26, 24 and 34 of Figure 1, and are longitudinally spaced therealong.

The construction of rows 24 of Figure 1 entails forming relatively wide transverse grooves in head 12 for receiving the bottom end of the bristles which define each bristle bar tuft 25. This can be done manually. If currently available automated machinery is used to form such side grooves, certain problems may arise in filling the grooves and in maintaining the bristles in each bristle bar at their desired perpendicular relation to head surface 14.

To overcome these problems, transverse rows each of closely spaced generally round holes are formed in the surface 14, instead of a wide groove, as shown in Figure 2. Individual rounded tufts 242 can then be inserted and fixed into these holes by automatic machinery currently available. The result yields rows 240 nearly identical to rows 24, with individual tufts 242 in close laterally spaced relation to each other.

The arrangement of rows in both embodiments is such that the rows 24 and 26 (as well as the

rows 240 and 26) alternate along the axis 16, except that two rows 26 are next to row 24. Thus, there are at this region of the head two rows 26 adjacent each other as measured along longitudinal axis 16 of head 12. The tufts of the rows 26 are preferably each of the same height and, as mentioned above, their height measured vertically is greater than that of the tufts in the rows 24. Typically, the height of the bristles in the first group 24 is about 8.5 mm, while the height (measured vertically) of the bristles of the tufts in the second and third groups 26 and 34 is typically about 10.5 mm. The longest tufts are those in group 34, with the next longest being tufts 30. The vertical height, however, of tufts 30 and 34 is the same when measured from the head surface 14. The spacing between rows 24 (240) 26, 30, 32 and 34 is typically about 2.3 mm (0.09 inches) measured at the bottom of the tufts.

In the embodiment of Figure 1, the lateral spacing between the tufts 32 is about 1.5 mm (0.06 inches) and the lateral spacing between the tufts 30 of any group 26 is about 7.1 mm (0.28 inches). The length of single tufts 25 is about 8.6 mm (0.34 inches) and their thickness is about 1.5 mm (0.06 inches). The lateral spacing between the tufts 36 is about 1.8 mm (0.070 inches). The base diameter of the tufts 36 and 30 is about 1.3 mm (0.050 inches) to about 1.5 mm (0.060 inches). The base diameter of the tufts 32 is about 1.0 mm (0.040 inches).

In the embodiment of Figure 2, the lateral spacing between the tufts 32 is about 1.7 mm (0.065 inches) and the lateral spacing between the tufts 30 of any row 26 is about 7.9 mm (0.312 inches). The lateral spacing between the tufts 242 is about 1.7 mm (0.065 inches) and that between the tufts 36 is typically about 2.3 mm (0.092 inches). The base diameter of all of the tufts is about 1.3 mm (0.050 inches) to about 1.5 mm (0.060 inches).

The specific cleaning function of the tufts in the embodiment of Figure 1 is illustrated in Figures 3 to 6 and their respective counterparts Figures 3a to 6a. The several groups are highlighted by vertical hatching at Figures 3 to 6. In this description, the tufts are described and grouped as to the functions they perform, while the previous description has described the tufts solely in terms of the several rows they define.

In Figures 3 and 3a, bristle bars 25 clean the broad surfaces of the teeth with centrally located bristle packs that maximise the cleaning contact to the teeth. The shorter length of these bristles brings them into contact with the surfaces of the teeth as the longer interproximal bristles 32 (as shown in Figure a and 4a) enter the crevices between the teeth. The tufts 32 and 36 are omitted from Figure 3a for purposes of clarity. Conventional

toothbrushes do not concentrate bristle density or tuft density to such a degree, with the result that less cleaning than is desirable is accomplished on the broad tooth surface.

In Figures 4 and 4a, the long, centrally located interproximal tufts of bristles 32 reach into the crevices between teeth. These bristle tufts are spaced to allow deep cleaning access. The specific placement pattern of these tufts allows for a dynamic and independent cleaning action. Conventional toothbrushes have bristles of the same length and density that tend to support each other structurally, acting as a single block and preventing the dynamic, independent action required for multi-task cleaning.

In Figures 5 and 5a, the long flexible bristles 30 line each side of the brush head 12 and are angled outwardly to sweep plaque gently from the teeth at the gumline and from in between the teeth. The intentional outward angle results in a soft, controlled bristle action aimed at the gumline. Conventional toothbrushes have vertical bristles whose flexing is not controlled or directed towards the gumline. Conventional vertical bristles can cause damage to the soft gum tissue.

In Figures 6 and 6a, the leading tip tufts of the bristles 36 at the tip of the brush head are angled forwards to ensure that the cleaning action reaches the teeth at the back of the mouth and cleans in between the teeth. Additionally, they clean the lingual surfaces and the sulcus areas of the front teeth. Vertical bristles limit the access of conventional toothbrushes to the back of the mouth where plaque continues to accumulate.

There are thus four functional groups of tufts in the head 12. These are: the bristle bar group defined by tufts 25, 242 and 246 for cleaning broad surfaces of the exposed sides of the teeth; the interproximal bristle group defined by the tufts 32 for cleaning the crevices between the teeth; the gumline bristle group defined by the tufts 30 for cleaning the teeth at the gumline; and the leading tip bristles group defined by the tufts 36 which ensures cleaning of the teeth at the back of the mouth.

In the embodiment of Figure 7, the five generally round tufts 242 in each of the rows 240 of Figure 2 are replaced by a greater number of quadrangular tufts 246 which are preferably rectangular. In all other respects, the bristle/tuft configuration and dimensions are the same. Each quadrangular tuft should preferably present about the same bristle area as the round holes in the head 12 which receive generally round tufts 242 of Figure 2. These tufts 246 can also be square in shape but when not square in shape, the smaller dimension of each tuft 246 is preferably along each row 240, i.e., perpendicular to the axis 16. The change from a

generally round to a quadrangular tuft cross section, with these dimensions of each quadrangle, permits seven quadrangular tufts 246 in each row instead of five round tufts 242, with only slight row lengthening. The cross-sectional area of each round tuft 242 is the same as the cross-sectional area of each quadrangular tuft 246, but the tuft dimension along the row 240 is smaller with a rectangular shaped tuft, the preferred shape, hence the greater number of bristles in a row 240 of rectangular tufts. Another advantage of the rectangular tuft shape is that it more nearly approximates to the bristle bars 25 of Figure 1 in the number of individual bristles in each row 240. Thus, the number of bristles in each row 240 in Figure 7 is greater than the number of bristles in each corresponding row 240 in Figure 2.

In the embodiment of Figure 7, the lateral spacing between the tufts 32 is about 1.7 mm (0.065 inches) and the lateral spacing between the tufts 30 is about 7.9 mm (0.312 inches). The lateral spacing between the tufts 246 is about 1.4 mm (0.054 inches) and that between the tufts 36 is about 2.3 mm (0.092 inches). The shortest dimension of each rectangular tuft 246 is about 1.0 mm (0.039 inches) and its longest dimension is about 1.3 mm (0.05 inches).

In Figure 7, the longest dimension of each rectangular tuft 246 is parallel to the axis 16. If desired, the rectangular tufts 246 of any row 240, or of all the rows 240, may be rotated through 90 degrees so that the longest dimension of each rectangular tuft is perpendicular to the axis 16. To preserve the required intertuft spacing along any row 240, it may then be necessary to omit one of the tufts 246, so that any row 240 would contain only six of the rectangular tufts.

The embodiment of Figure 8 is similar in construction to that shown in Figure 7, in that it also employs rectangular polygonal tufts. The differences relate to the tuft sizes and spacing as set out below, and to those tufts at the free end of the head, i.e., remote from the handle. In the embodiments previously described, two tufts 36 are located nearest the head free end, with each tuft tilted both forwards (away from the handle) and laterally outwards, away from the head centre along axis 16. In the Figure 8 embodiment, the two forwardmost tufts 36 are replaced by three tufts 37 arranged in a single transverse row 250, parallel to the transverse rows 240. Each tuft 37 is of the same size. The middle tuft is centrally located on the tuft head 12, coincident with the axis 16, and is perpendicular to the brush head. The two outermost tufts 37 tilt laterally outwards at about 12 degrees from the vertical. These tufts can also tilt forwards as do the tufts 36 in the embodiment of Figure 7. The tufts 37 each lie in a plane transverse to the

axis 16 and perform a function similar to that of the tufts 36.

In the embodiment of Figure 8, the longitudinal spacing (as measured along axis 16) between the transverse rows of the tufts is 2.5 mm (0.10 inch). The spacing between the tuft receiving openings in the brush head, as measured along each transverse row, is about 3.8 mm (0.15 inch). The diameter of the brush head openings which receive the round tufts is about 1.5 mm (0.06 inch). The shortest dimension of each rectangular tuft 248 is about 1.2 mm (0.047 inch), while the longest dimension is about 1.5 mm (0.060 inch). The rectangular tufts of Figure 8 are each denoted as 246.

In Figure 8, as in the embodiment of Figure 7, the longest dimension of each rectangular tuft is parallel to the axis 16. If desired, the rectangular tufts 248 of any row 240, or of all the rows 240, may be rotated through 90 degrees, so that the longest dimension of each rectangular tuft 248 is perpendicular to the axis 16. To preserve the required intertuft spacing along any row 240, it may then be necessary to omit one of the tufts 248.

The head of the embodiment of Figure 8 is about 2.5 mm (0.1 inch) longer than the head of the embodiment of Figure 7, while its width is about 0.8 mm (0.030 inches) wider. The diameter of tufts 32 and 37 may be the same or may differ, though preferably, they are of the same diameter.

#### Claims

1. A toothbrush head (12) having a handle (20) attached thereto, the head (12) having a longitudinal axis (16) and terminating in a free end remote from the handle, the head (12) having a surface (14) from which tufts of bristles extend generally upwardly characterised in that the tufts are arranged in three groups in the form of rows which are transverse to the longitudinal axis (16); each row being longitudinally spaced apart along the head from the next adjacent row; the tufts of each row of the first group (24, 240) being shorter in height than those in the other rows; the tufts in each row of the second group (26) being so arranged that the endmost tufts (30) each tilt laterally outwards towards respective sides of the head, and the remaining tufts (32) of each row of each second group (26) extend substantially perpendicularly to the head flat surface (14); some of the first and second groups (24, 26) alternating along the longitudinal axis (26) of the head (12); the third group (34, 250) of tufts being located nearest to the head free end and including at least two tufts (36, 37) each tilting laterally outwards towards respective sides of the head (12).

2. A toothbrush head as claimed in claim 1 characterised in that the tufts of said second and third groups are of the same height when measured vertically.
3. A toothbrush head as claimed in claim 1 or claim 2 characterised in that two rows of tufts of said second group are positioned longitudinally next to each other and are located between said third group and that row of said first group which is nearest to the free end of the head.
4. A toothbrush head as claimed in claim 1, 2 or 3, characterised in that each tuft of the third group (34) of tufts tilts laterally outwards at an angle of about 30 degrees from the vertical.
5. A toothbrush head as claimed in any of claims 1 to 4 characterised in that a row of said second group (26) of tufts is nearer to the handle than any other row of any group.
6. A toothbrush head as claimed in any one of claims 1 to 5 characterised in that each of the endmost tufts (30) of the second group (26) of tufts tilts laterally at about 12 degrees to the vertical.
7. A toothbrush head as claimed in any of claims 1 to 6, characterised in that each row of said first group (24) of tufts comprises a single tuft (25) of a width substantially spanning the width of the head (12).
8. A toothbrush head as claimed in any one of claims 1 to 7 characterised in that each row of said first group (24, 240) of tufts comprises a plurality of laterally spaced tufts (242, 246, 248) which together substantially span the width of the head, the said first group of tufts being laterally spaced from each other.
9. A toothbrush head as claimed in any one of claims 1 to 8 characterised in that each tuft in said first group is round.
10. A toothbrush head as claimed in any one of claims 1 to 8 characterised in that each tuft in said first group is rectangular.
11. A toothbrush head as claimed in claim 10 characterised in that the shorter dimension of each rectangular tuft is transverse to said longitudinal axis.
12. A toothbrush head as claimed in any one of claims 1 to 11 characterised in that the said

two tufts (36) of said third row also tilt forwardly, away from said handle.

13. A toothbrush head as claimed in any one of claims 1 to 12 characterised in that the said third group of tufts (250) includes a third tuft (37) located between said two tufts (37), said third tuft (37) extending substantially perpendicularly from said head surface.
14. A toothbrush head as claimed in any one of claims 1 to 13 characterised in that all of the tufts (37) in said third row (250) lie in a plane substantially orthogonal to said longitudinal axis (16).

#### Patentansprüche

1. Zahnbürstenkopf (12) mit einem daran angebrachten Griff (20), wobei der Kopf (12) eine Längsachse (16) hat und an einem von dem Griff entfernten freien Ende endet, wobei der Kopf (12) eine Oberfläche (14) hat, von der sich Büschel von Borsten allgemein nach oben erstrecken, dadurch gekennzeichnet, daß die Büschel in drei Gruppen in der Form von Reihen angeordnet sind, die quer zu der Längsachse (16) verlaufen; wobei jede Reihe entlang des Kopfes in Längsrichtung zu der nächsten benachbarten Reihe beabstandet ist; wobei die Büschel jeder Reihe der ersten Gruppe (24, 240) in der Höhe kürzer sind als diejenigen in den anderen Reihen; wobei die Büschel in jeder Reihe der zweiten Gruppe (26) so angeordnet sind, daß die endständigen Büschel (30) jeweils seitwärts nach außen auf die jeweiligen Seiten des Kopfes zu geneigt sind und sich die übrigen Büschel (32) jeder Reihe jeder zweiten Gruppe (26) im wesentlichen senkrecht zu der flachen Oberfläche (14) des Kopfes erstrecken; wobei sich einige der ersten und zweiten Gruppen (24, 26) entlang der Längsachse (26) des Kopfes (12) abwechseln; wobei sich die dritte Gruppe (34, 250) von Büschen zu dem freien Ende des Kopfes am nächsten befindet und wenigstens zwei Büschel (36, 37) aufweist, die sich jeweils seitwärts nach außen auf jeweilige Seiten des Kopfes (12) zu neigen.
2. Zahnbürstenkopf nach Anspruch 1, dadurch gekennzeichnet, daß die Büschel der zweiten und dritten Gruppen dieselbe Höhe haben, wenn vertikal gemessen.
3. Zahnbürstenkopf nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß sich zwei Reihen von Büscheln der zweiten Gruppe

in Längsrichtung nebeneinander befinden und zwischen der dritten Gruppe und der Reihe der ersten Gruppe, die dem freien Ende des Kopfes am nächsten ist, angeordnet sind.

4. Zahnbürstenkopf nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß sich jedes Büschel der dritten Gruppe (34) von Büscheln seitwärts nach außen unter einem Winkel von etwa 30° zur Vertikalen neigt.
5. Zahnbürstenkopf nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß eine Reihe der zweiten Gruppe (26) von Büscheln dem Griff näher ist als irgendeine andere Reihe irgendeiner Gruppe.
6. Zahnbürstenkopf nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß sich jedes der endständigen Büschel (30) der zweiten Gruppe (26) von Büscheln seitwärts unter etwa 12° zur Vertikalen neigt.
7. Zahnbürstenkopf nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß jede Reihe der ersten Gruppe (24) von Büscheln ein einziges Büschel (25) von einer Breite aufweist, die sich im wesentlichen über die Breite des Kopfes (12) erstreckt.
8. Zahnbürstenkopf nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß jede Reihe der ersten Gruppe (24, 240) von Büscheln eine Anzahl von seitwärts beabstandeten Büscheln (242, 246, 248) aufweist, die sich zusammen im wesentlichen über die Breite des Kopfes erstrecken, wobei die erste Gruppe von Büscheln seitwärts voneinander beabstandet ist.
9. Zahnbürstenkopf nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß jedes Büschel in der ersten Gruppe rund ist.
10. Zahnbürstenkopf nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß jedes Büschel in der ersten Gruppe rechteckig ist.
11. Zahnbürstenkopf nach Anspruch 10, dadurch gekennzeichnet, daß die kürzere Abmessung jedes rechteckigen Büschels quer zur Längsachse verläuft.
12. Zahnbürstenkopf nach einem der Ansprüche 1 bis 11, dadurch gekennzeichnet, daß sich die beiden Büschel (36) der dritten Reihe auch nach vorne neigen, von dem Griff weg.



13. Zahnbürstenkopf nach einem der Ansprüche 1 bis 12, dadurch gekennzeichnet, daß die dritte Gruppe von Büscheln (250) ein drittes Büschel (37) aufweist, das sich zwischen den zwei Büscheln (37) befindet, wobei sich das dritte Büschel (37) im wesentlichen senkrecht von der Kopfoberfläche erstreckt.

14. Zahnbürstenkopf nach einem der Ansprüche 1 bis 13, dadurch gekennzeichnet, daß alle Büschel (37) in der dritten Reihe (250) in einer Ebene liegen, die im wesentlichen orthogonal zur Längsachse (16) verläuft.

#### Revendications

1. Tête de brosse à dents (12) à laquelle est fixée une poignée (20), la tête (12) possédant un axe longitudinal (16) et se terminant par une extrémité libre éloignée de la poignée, la tête (12) ayant une surface (14) à partir de laquelle les mèches de poil font saillie de manière générale vers le haut, caractérisée en ce que les mèches sont disposées en trois groupes sous la forme de rangées qui sont transversales à l'axe longitudinal (16); chaque rangée étant espacée longitudinalement le long de la tête de la rangée suivante adjacente; les mèches de chaque rangée du premier groupe (24, 240) étant plus courtes que celles des autres rangées; les mèches de chaque rangée du second groupe (26) étant disposées de manière à ce que les mèches (30) les plus extrêmes sont chacune inclinées latéralement à l'extérieur en direction des côtés respectifs de la tête, et les mèches (32) restantes de chaque rangée de chaque second groupe (26) s'étendent sensiblement perpendiculairement à la surface (14) plate de la tête; quelques uns des premier et second groupes (24, 26) étant placés alternativement le long de l'axe longitudinal (26) de la tête (12); le troisième groupe (34, 250) de mèches étant situé le plus proche de l'extrémité libre de la tête et comportant au moins deux touffes (36, 37), chacune étant inclinée latéralement vers l'extérieur en direction des côtés respectifs de la tête (12).

2. Tête de brosse à dents selon la revendication 1, caractérisée en ce que les mèches des second et troisième groupes sont de la même hauteur lorsqu'elles sont mesurées verticalement.

3. Tête de brosse à dents selon la revendication 1 ou 2, caractérisée en ce que deux rangées de mèches du second groupe sont placées longitudinalement au voisinage l'une de l'autre

et sont situées entre le troisième groupe et la rangée du premier groupe qui est la plus proche de l'extrémité libre de la tête.

4. Tête de brosse à dents selon la revendication 1, 2 ou 3, caractérisée en ce que chaque mèche du troisième groupe (34) de mèches est inclinée latéralement vers l'extérieur d'un angle d'environ 30° par rapport à la verticale.

5. Tête de brosse à dents selon l'une quelconque des revendications 1 à 4, caractérisée en ce qu'une rangée du second groupe (26) de mèches est plus proche de la poignée que n'importe quelle autre rangée de n'importe quel groupe.

6. Tête de brosse à dents selon l'une quelconque des revendications 1 à 5, caractérisée en ce que chacune des mèches (30) les plus extrêmes du second groupe (26) de mèches est inclinée latéralement d'un angle d'environ 12° par rapport à la verticale.

7. Tête de brosse à dents selon l'une quelconque des revendications 1 à 6, caractérisée en ce que chaque rangée du premier groupe (24) de mèches comprend une seule mèche (25) d'une largeur sensiblement aussi grande que celle de la tête (12).

8. Tête de brosse à dents selon l'une quelconque des revendications 1 à 7, caractérisée en ce que chaque rangée du premier groupe (24, 240) de mèches comprend plusieurs mèches (242, 246, 248) espacées latéralement qui ont ensemble une largeur sensiblement égale à celle de la tête, le premier groupe de mèches étant espacé latéralement les uns des autres.

9. Tête de brosse à dents selon l'une quelconque des revendications 1 à 8, caractérisée en ce que chaque mèche du premier groupe est circulaire.

10. Tête de brosse à dents selon l'une quelconque des revendications 1 à 8, caractérisée en ce que chaque mèche du premier groupe est rectangulaire.

11. Tête de brosse à dents selon la revendication 10, caractérisée en ce que la plus petite dimension de chaque mèche rectangulaire est transversale à l'axe longitudinal.

12. Tête de brosse à dents selon l'une quelconque des revendications 1 à 11, caractérisée en ce que les deux mèches (36) de la troisième

rangée est aussi inclinée vers l'avant, en direction opposée de la poignée.

13. Tête de brosse à dents selon l'une quelconque des revendications 1 à 12, caractérisée en ce que le troisième groupe de mèches (250) comporte une troisième mèche (37) située entre les deux mèches (37), la troisième mèche (37) s'étendant sensiblement perpendiculairement par rapport à la surface de la tête. 5 10
14. Tête de brosse à dents selon l'une quelconque des revendications 1 à 13, caractérisée en ce que toutes les mèches (37) de la troisième rangée (250) s'étendent dans un plan sensiblement perpendiculaire à l'axe longitudinal (16). 15

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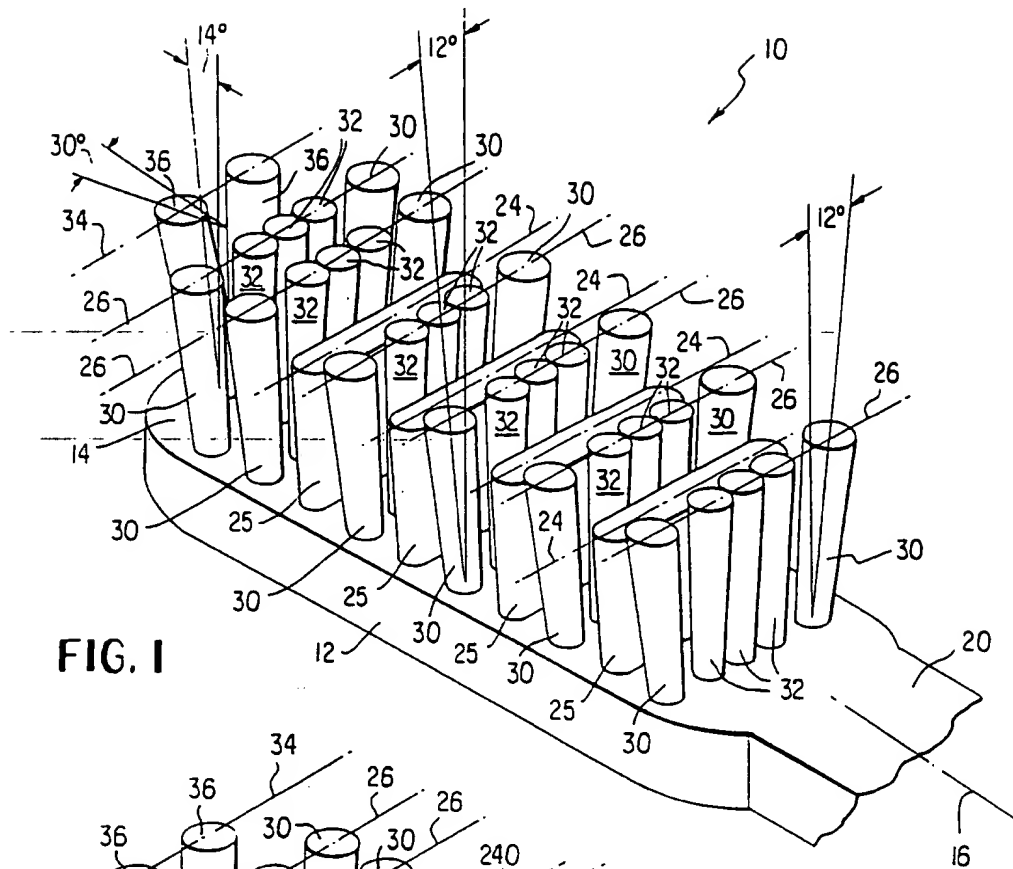


FIG. 1

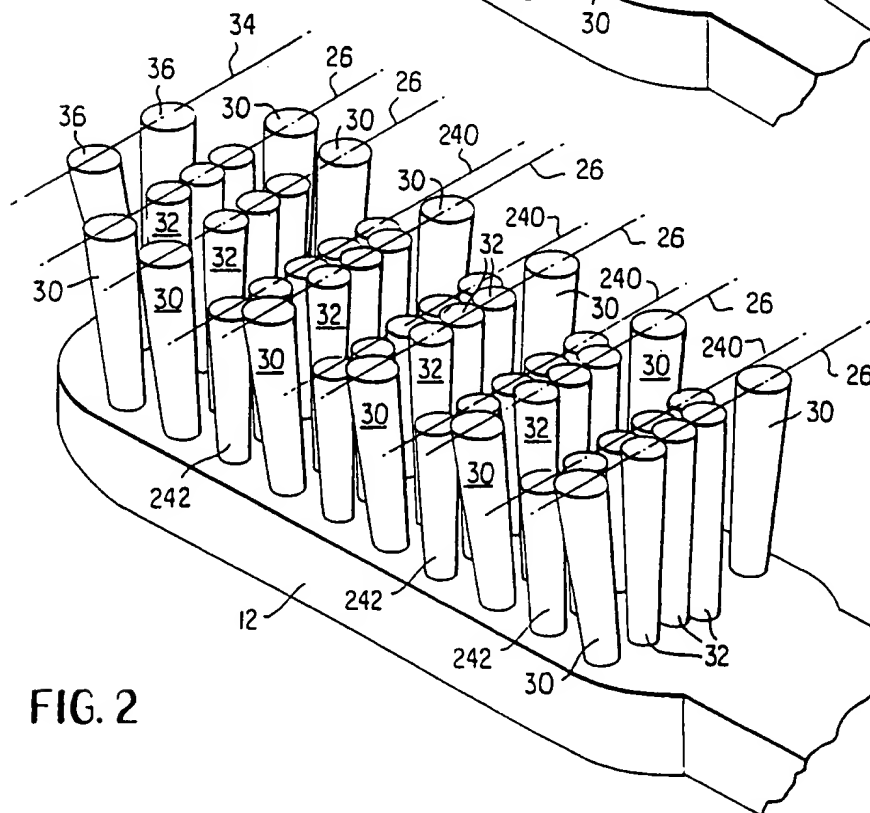


FIG. 2

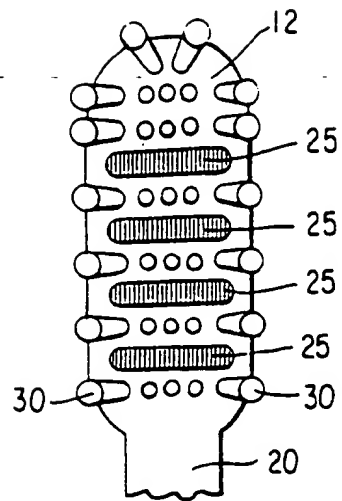


FIG. 3

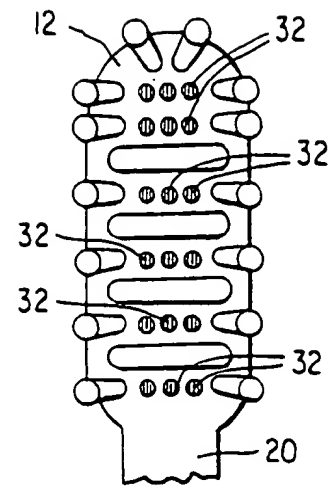


FIG. 4

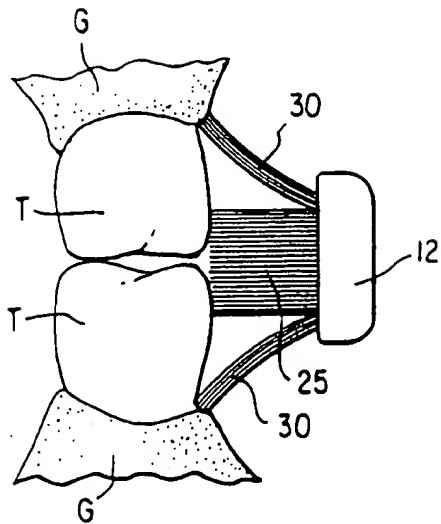


FIG. 3a

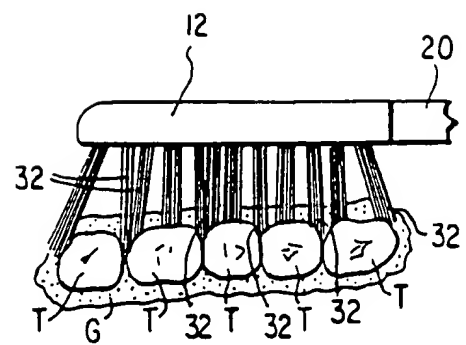


FIG. 4a

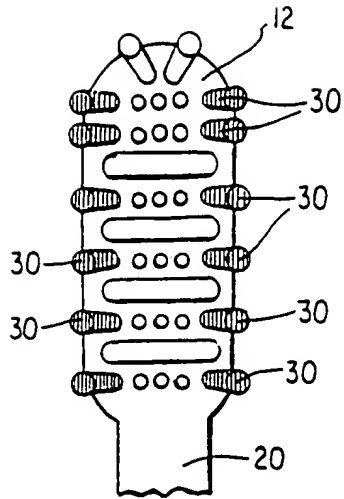


FIG. 5

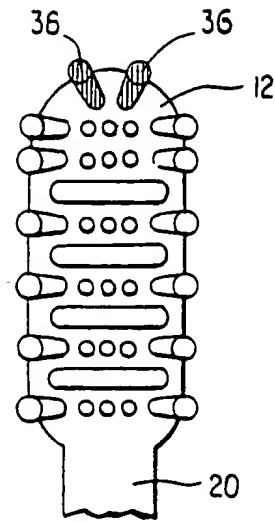


FIG. 6

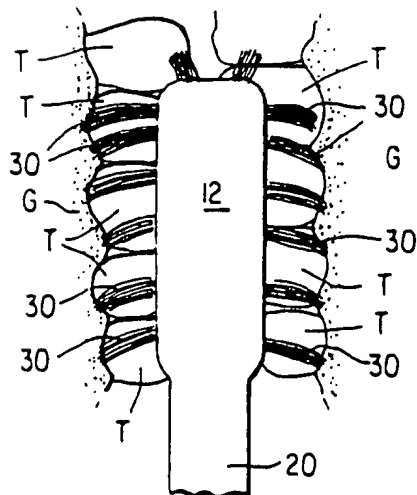


FIG. 5a

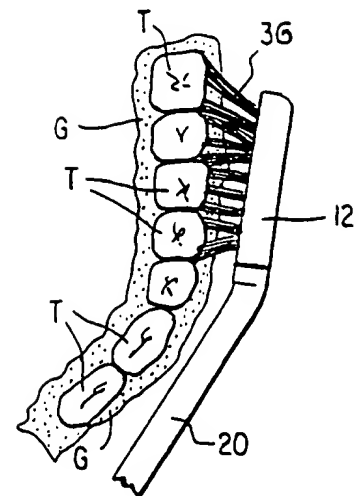
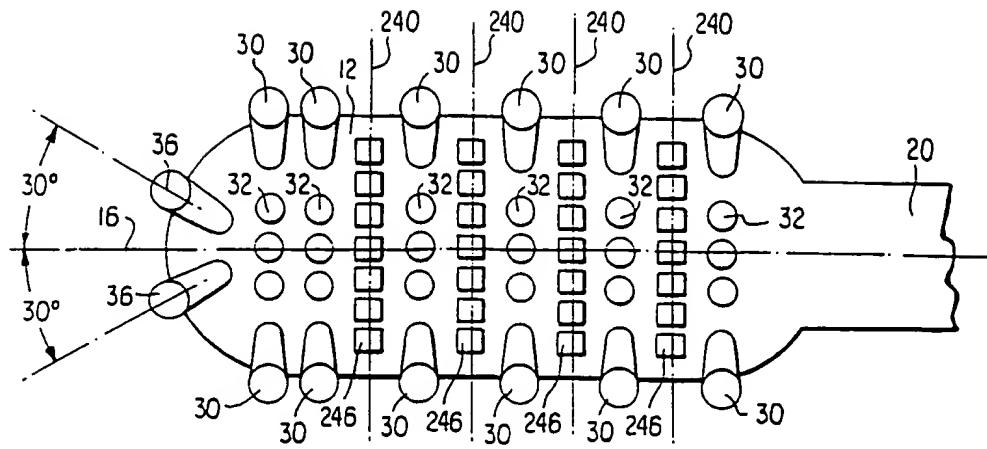


FIG. 6a



**FIG. 7**

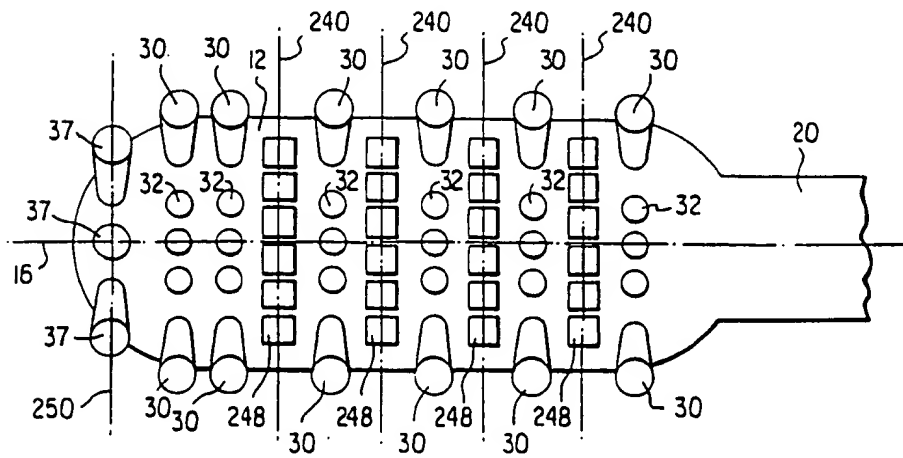


FIG. 8